

SURFTEST SV-3100



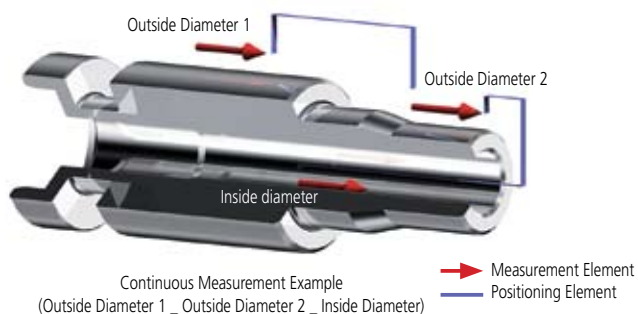
Next-generation surface roughness measuring machine delivers high accuracy, high drive speed and simplified CNC measurement

A wide variety of functions to enhance measurement efficiency



High accuracy linear encoders on X/Z2-axis

The drive unit (X axis) and column (Z2 axis) are equipped with high-accuracy linear encoders (ABS type on Z2 axis) enabling fully automatic measurement combining vertical and horizontal movement. This improves reproducibility of continuous automatic measurement of small holes in the vertical direction and repeated measurement of parts which are difficult to position.



Improved measurement efficiency and the highest drive speed in its class

X axis: 80 mm/s, Z2 axis: 20 mm/s
Dramatically increased drive speed further reduces total measurement time.

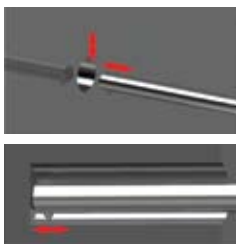


Highest traverse linearity in its class

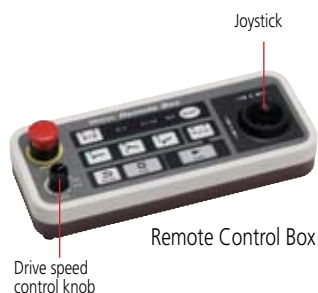
X axis: $\pm (0.05 + 0.001 L) \mu\text{m}^*$, 100 mm range model
0.5 μm / 200 mm, 200 mm range model
Designed to handle workpieces calling for high-accuracy inspection.
*L = Drive length (mm)

Remarkable ease of operation

- Small holes and inclined planes can be efficiently measured using the inclined X-axis drive unit and fine-feed handles on the X- and Z2-axes.

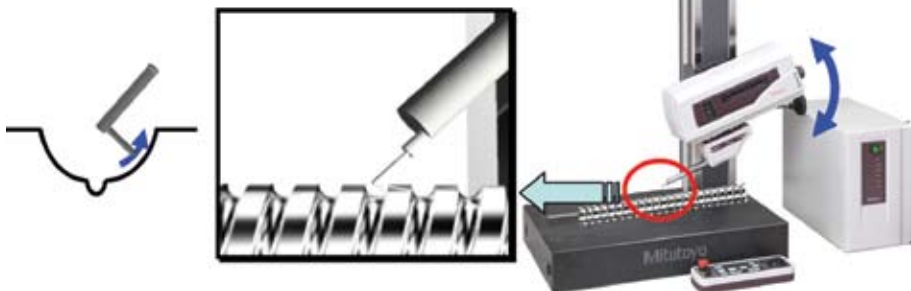


Fine-feed handle allows easy positioning when measuring small holes



Remote Control Box

- The drive unit can be inclined by $\pm 45^\circ$. This allows the SV-3100 to rapidly measure an inclined surface.



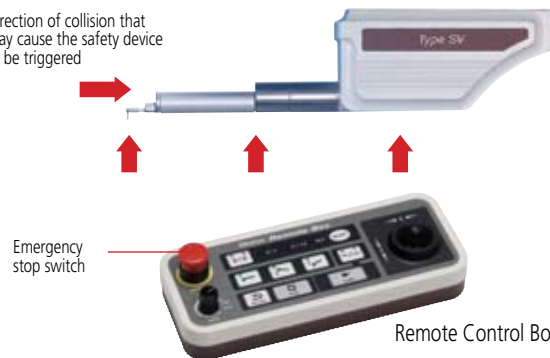
Superb durability

In order to maintain the traverse linearity specification for an extended period of time, Mitutoyo has adopted highly rigid ceramic guides that combine the characteristics of smallest secular change with remarkable resistance to abrasion.

Safety functions to protect operator, measuring unit and workpiece

- To enhance safety during fast traverse, the Z-axis detector unit incorporates a safety device (Automatic Stop-On-Collision Mechanism) and the new remote control box features an easily reached emergency stop switch next to the drive speed control knob.

Direction of collision that may cause the safety device to be triggered



- All detector and drive unit cables are housed inside the main unit to eliminate any risk of abrasion and guarantee trouble free, high-speed operation.



Optional accessories for automatic measurement

Y-axis table: 178-097

Enables efficient, automatic measurement of multiple aligned workpieces and multiple points on a single measurement surface.

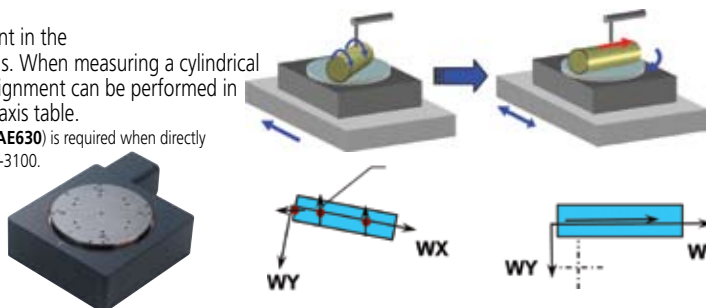


Travel range	200 mm
Resolution	0.05 μ m
Positioning accuracy	± 3 μ m
Drive speed	Max. 80 mm/s
Maximum load	50 kg
Mass	28 kg

θ 1-axis table: 12AAD975*

For efficient measurement in the axial/transverse directions. When measuring a cylindrical workpiece, automatic alignment can be performed in combination with the Y-axis table.

* θ 1-axis mounting plate (12AAE630) is required when directly installing on the base of the SV-3100.



Displacement	360°
Resolution	0.004°
Maximum load	12 kg
Rotational speed	Max. 10°/s
Mass	7 kg

θ 2-axis table: 178-078*

For measuring multiple points on a cylindrical workpiece and automating front/rear-side measurement.

* θ 2-axis mounting plate (12AAE718) is required when directly installing on the base of the SV-3100.



Displacement	360°
Resolution	0.0072°
Maximum load (loading moment)	4 kg (343 N•cm or less)
Rotational speed	Max. 18°/s
Mass	5 kg

Quick chuck: 211-032

This chuck is useful when measuring small workpieces. Features knurled ring clamping.



Clamping range	Internal jaws	OD: 1 - 36 mm
	Internal jaws	ID: 14 - 70 mm
	External jaws	OD: 1 - 75 mm
Dimensions	$\varnothing 118 \times 41$ mm	
Mass	1.2 kg	

Micro-chuck: 211-031

This chuck is suitable for clamping extra-small diameter workpieces ($\varnothing 1$ mm or less), which cannot be retained with the centering chuck.



Retention range	OD: 0 - 1.5 mm
Dimensions	$\varnothing 118 \times 48.5$ mm
Mass	0.6 kg

Auto-levelling table: 178-087

This is a stage that performs fully automatic levelling as measurement starts, freeing the user from this troublesome operation. Fully automatic levelling can be done quickly by anyone. In addition, the operation is easy and reliable.



Inclination adjustment angle	$\pm 2^\circ$
Maximum load	7 kg
Table dimensions	130 x 100 mm
Mass	3.5 kg

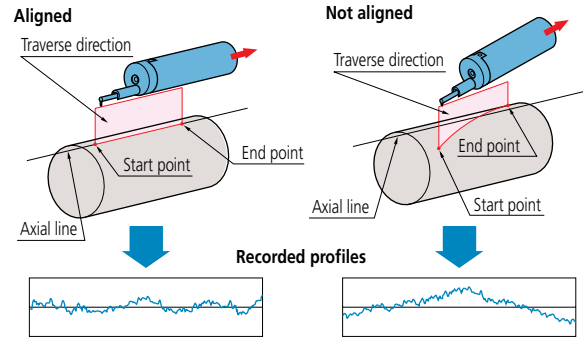
For expanding the application range

3-axis Adjustment Table

This table helps make the alignment adjustments required when measuring cylindrical surfaces. The corrections for the pitch angle and the swivel angle are determined from a preliminary measurement and the Digimatic micrometers are adjusted accordingly. A flat-surfaced workpiece can also be levelled with this table.



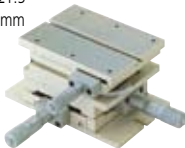
178-047



Levelling table

178-043-1 (mm), 178-053-1 (inch)

- Table top: 130 x 100 mm
- Levelling range: $\pm 1.5^\circ$
- XY travel: ± 12.5 mm



Digital levelling table

178-042-1 (mm)

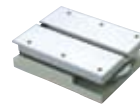
- Table top: 130 x 100 mm
- Levelling range: $\pm 1.5^\circ$
- XY travel: ± 12.5 mm



Levelling table

178-016

- Table top: 130 x 100 mm
- Levelling range: $\pm 1.5^\circ$
- Height: 40 mm



Calibration stand

12AAG175

For mounting a roughness specimen or step gage during calibration.



V-block

998291

- Workpiece diameter: 1 mm to 160 mm
- Can be mounted on a levelling table



Precision vice

178-019

- Max. workpiece size: 36 mm
- Can be mounted on a levelling table



Cross-travel table

218-001 (mm), 218-011 (inch)

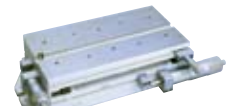
- Table top: 280 x 180 mm
- XY travel: 100 x 50 mm



Cross-travel table

218-041 (mm), 218-051 (inch)

- Table top: 280 x 152 mm
- XY travel: 50 x 25 mm



Rotary vice

218-003

- Two-slide jaw type
- Max. workpiece size: 60 mm
- Minimum reading: 1°



Centre support

172-142

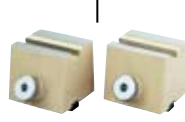
- Max. workpiece dia.: 120 mm
- 60mm riser is optional



Centre support riser

172-143

- Used with a centre support
- Max. workpiece dia.: 240 mm



Swivel centre support

172-197

- Max. workpiece dia.: 80 mm*
- *65 mm when swivelled 10°
- Max. workpiece length: 140 mm



Holder with clamp

176-107

- Used with a cross-travel table or levelling table
- Max. workpiece height: 35 mm



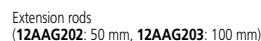
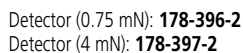
V-block with clamp

172-234, 172-378

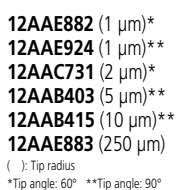
- Used with a cross-travel table or levelling table
- Max. workpiece dia.: 50 mm (172-234), 25 mm (172-378)



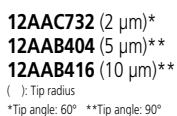
Op



Detail A

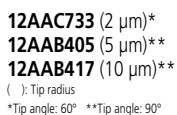


12AAE898 (2 μm)*
12AAE914 (5 μm)**
 (): Tip radius
 *Tip angle: 60° **Tip angle: 90°

[illegible]

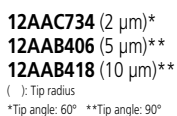
12AAE892 (2 μm)*
12AAE908 (5 μm)**
 (): Tip radius
 *Tip angle: 60° **Tip angle: 90°

Technical drawing of Detail A (S=5/1) showing a cross-section of a roof structure. It features a vertical pipe with a diameter of 0.4, a horizontal pipe with a diameter of 0.3, and a vertical dimension of 1.2. The roof slope is indicated as 60°/90°.



Technical drawing of a shaft assembly. The shaft has a total length of 93.8. A dimension of 87.7 is shown for the main section. A dimension of 41 is shown for a specific section. The shaft is supported by a ball bearing with a diameter of Ø1.6. The distance from the bearing to the end of the shaft is 12.4. The distance from the bearing to the start of the 41 section is 31.2.

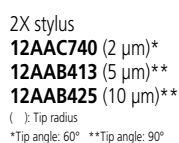
12AAE884 (0.8 mm)
(): Tip radius



Technical drawing of a mechanical part. The main view shows a shaft with a ball joint (Ø0.5) and a detail view 'Detail A' showing a cross-section with dimensions 43.8, 37.7, 7, and Ø2.4.

12AAE885 (0.25 mm)
(): Tip radius

Technical drawing of a bolt and nut assembly. The bolt is shown in cross-section with dimensions: total length 94.7, head diameter Ø1.2, head thickness 0.9, and shank diameter Ø2.4. The nut is shown in cross-section with dimensions: total height 7.6, top flange thickness 5.2, and bottom flange thickness 2.4. A detail view 'Detail A' shows the bolt head with 'Colour coding'.

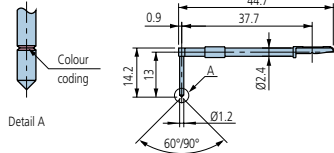


3X stylus
12AAC741 (2 μm)*
12AAB414 (5 μm)**
12AAB426 (10 μm)**
 (): Tip radius
 *Tip angle: 60° **Tip angle: 90°

Technical drawing of a mechanical part. The main view shows a horizontal shaft with a diameter of $\varnothing 1.2$ and a total length of 94.4. A section line A-A is indicated. The shaft has a shoulder with a diameter of $\varnothing 0.6$ and a length of 45. The end view shows a diameter of $\varnothing 0.6$ and a length of 0.6. A detail view A shows a cross-section of the shaft with a diameter of $\varnothing 0.6$ and a length of 0.6. The detail view also shows a shoulder with a diameter of $\varnothing 0.4$ and a length of 1.6.

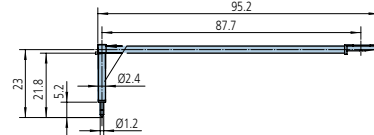
12AAE938 (2 μm)*
12AAE940 (5 μm)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For deep groove (10 mm)



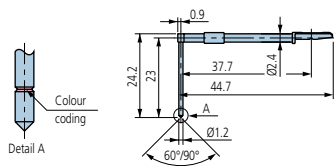
12AAC735 (2 µm)*
12AAB409 (5 µm)**
12AAB421 (10 µm)**
 (): Tip radius
 *Tip angle: 60° **Tip angle: 90°

For deep groove (20 mm)/Double-length for deep hole



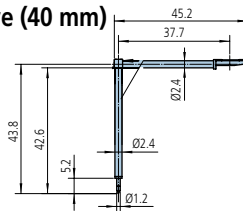
12AAE893 (2 µm)*
12AAE909 (5 µm)**
 (): Tip radius
 *Tip angle: 60° **Tip angle: 90°

For deep groove (20 mm)



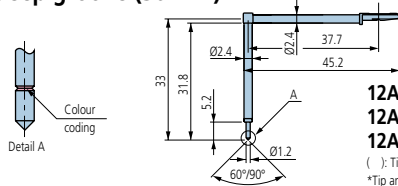
12AAC736 (2 µm)*
12AAB408 (5 µm)**
12AAB420 (10 µm)**
 (): Tip radius
 *Tip angle: 60° **Tip angle: 90°

For deep groove (40 mm)



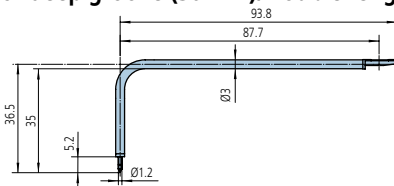
12AAE895 (2 µm)*
12AAE911 (5 µm)**
 (): Tip radius
 *Tip angle: 60° **Tip angle: 90°

For deep groove (30 mm)



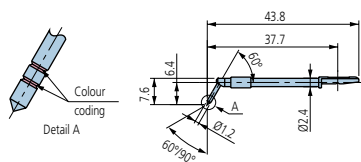
12AAC737 (2 µm)*
12AAB407 (5 µm)**
12AAB419 (10 µm)**
 (): Tip radius
 *Tip angle: 60° **Tip angle: 90°

For deep groove (30 mm)/Double-length for deep hole



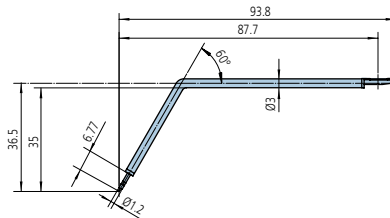
12AAE894 (2 µm)*
12AAE910 (5 µm)**
 (): Tip radius
 *Tip angle: 60° **Tip angle: 90°

For gear tooth



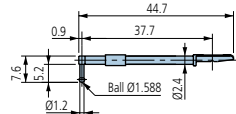
12AAB339 (2 µm)*
12AAB410 (5 µm)**
12AAB422 (10 µm)**
 (): Tip radius
 *Tip angle: 60° **Tip angle: 90°

For gear tooth/Double-length for deep hole



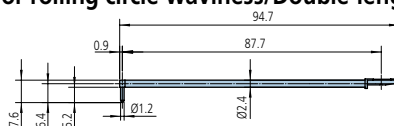
12AAE896 (2 µm)*
12AAE912 (5 µm)**
 (): Tip radius

For rolling circle waviness surface



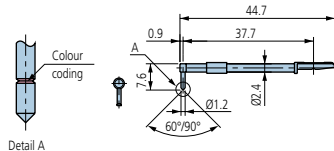
12AAB338 (0.8 mm)
 (): Tip radius

For rolling circle waviness/Double-length for deep hole



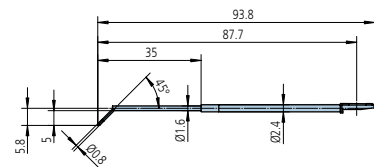
12AAE886 (0.25 mm)
 (): Tip radius

For knife-edge detector



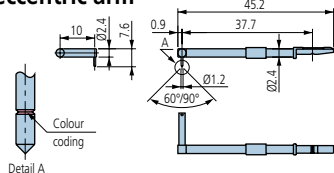
12AAC738 (2 µm)*
12AAB411 (5 µm)**
12AAB423 (10 µm)**
 (): Tip radius
 *Tip angle: 60° **Tip angle: 90°

For corner hole/Double-length for deep hole



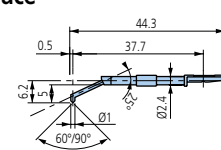
12AAE897 (2 µm)*
12AAE913 (5 µm)**
 (): Tip radius
 *Tip angle: 60° **Tip angle: 90°

For eccentric arm



12AAC739 (2 µm)*
12AAB412 (5 µm)**
12AAB424 (10 µm)**
 (): Tip radius
 *Tip angle: 60° **Tip angle: 90°

For bottom surface



12AAE899 (2 µm)*
12AAE915 (5 µm)**
 (): Tip radius
 *Tip angle: 60° **Tip angle: 90°

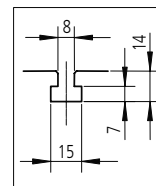
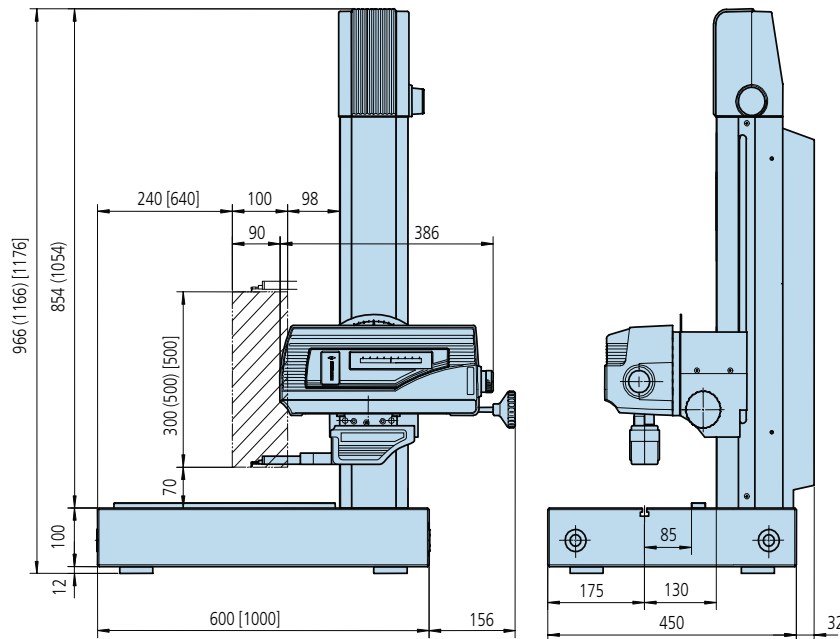
Specifications

Model		SV-3100S4	SV-3100H4	SV-3100W4	SV-3100S8	SV-3100H8	SV-3100W8
Order No.	with 0.75 mN detector	178-471-1 (mm)	178-472-1 (mm)	178-473-1 (mm)	178-476-1 (mm)	178-477-1 (mm)	178-478-1 (mm)
		178-481-1 (inch)	178-482-1 (inch)	178-483-1 (inch)	178-486-1 (inch)	178-487-1 (inch)	178-488-1 (inch)
	with 4 mN detector	178-451-2 (mm)	178-452-2 (mm)	178-453-2 (mm)	178-456-2 (mm)	178-457-2 (mm)	178-458-2 (mm)
		178-461-2 (inch)	178-462-2 (inch)	178-463-2 (inch)	178-466-2 (inch)	178-467-2 (inch)	178-468-2 (inch)
Measuring range	X axis	100 mm			200 mm		
	Z1 axis (detector unit)	800 μm / 80 μm / 8 μm					
Z2 axis (column) travel		300 mm	500 mm	500 mm	300 mm	500 mm	500 mm
X axis inclining range		±45°					
Scale unit	X axis	Linear encoder					
	Z1 axis (detector unit)	Differential inductance					
	Z2 axis (column)	ABS scale					
Resolution	X axis	0.05 μm					
	Z1 axis (detector unit)	0.01 μm / 800 μm, 0.001 μm / 80 μm, 0.0001 μm / 8 μm					
	Z2 axis (column)	1 μm					
Drive speed	X axis	0 - 80 mm/s and manual					
	Z2 axis (column)	0 - 20 mm/s and manual					
Measuring speed		0.02 - 5 mm/s					
Traverse linearity (with the X axis in horizontal orientation)		(0.05+0.001L) μm, L = traverse length (mm)			0.5 μm / 200 mm		
Stylus up/down operation		Arc movement					
Point of stylus		Downward					
Measuring force		0.75 mN or 4 mN					
Stylus tip (standard accessory)		60°, R2 μm or 90°, R5 μm					
Base size (width x depth)		600 mm x 450 mm		1000 x 450 mm	600 mm x 450 mm		1000 x 450 mm
Base material		Granite					
External dimensions (width x depth x height)	Main unit	756x482x966 mm	756x482x1166 mm	1156x482x1176 mm	766x482x966 mm	766x482x1166 mm	1166x482x1176 mm
	Control unit	221 x 344 x 490 mm					
	Remote control box	248 x 102 x 62.2 mm					
Mass	Main unit	140 kg	150 kg	220 kg	140 kg	150 kg	220 kg
	Control unit	14 kg					
	Remote control box	0.9 kg					
Operating temperature range		15 to 25 °C (within a temperature variation of ±1 °C between temperatures at calibration and measurement)					
Operating humidity range		20 - 80% RH (without condensation)					
Storage temperature range		-10 to 50 °C					
Storage humidity range		5 - 90% RH (without condensation)					
Power supply specifications		100 - 120 VAC, 200 - 240 VAC ±10%, 50/60 Hz					
Power consumption (main unit only)		400 W					

Dimensions

**SV-3100S4
SV-3100H4
SV-3100W4**

Unit: mm



T-slot dimensions
(common to all types)

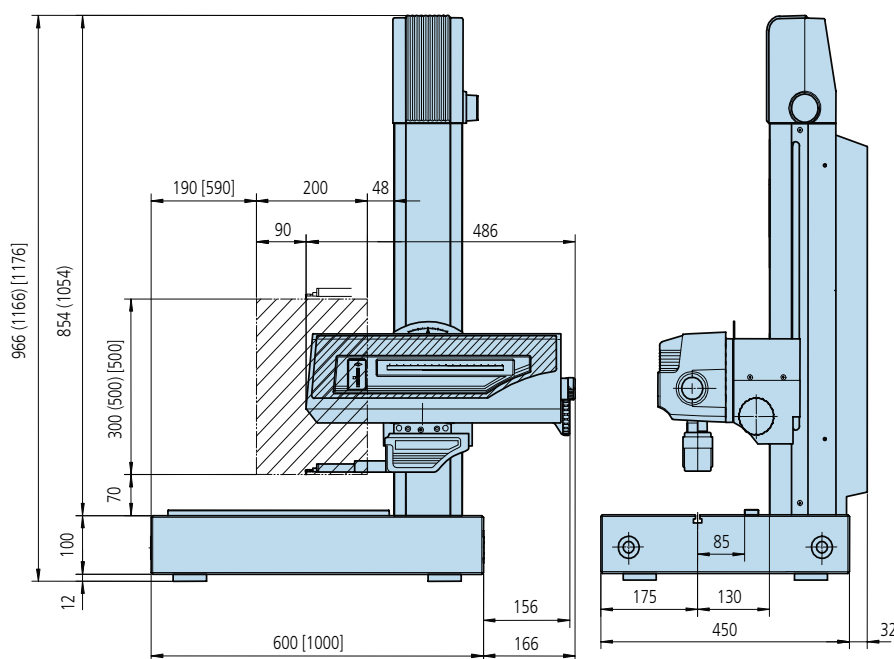


Measuring
range

(): SV-3100H4
[]: SV-3100W4

The dimensions in parentheses
indicate those of the H4 type.

**SV-3100S8
SV-3100H8
SV-3100W8**



Measuring
range

(): SV-3100H8
[]: SV-3100W8

The dimensions in parentheses
indicate those of the H8 type.

Analysis software, SURFPAK-TC/EZ/SV and FORMTRACEPAK

Types of software

According to customer applications, Mitutoyo provides 4 types of control/evaluation software.

Software		SURFPAK-TC Simple operation by touch-panel analysis unit	SURFPAK-EZ Simple operation by PC	SURFPAK-SV Standard software	FORMTRACEPAK For high-end evaluation and CNC applications
Type of analysis unit		TCON	PC		
Printed page layout		Fixed			Free
Alignment and perpendicularity adjustment		Manual			Manual/automatic*
Output to MeasurLink**		-			Available
Connectable options	Auto-levelling table	Available			
	Y-axis table	-			Available
	Ø1 table	-			Available
	Ø2 table	-			Available

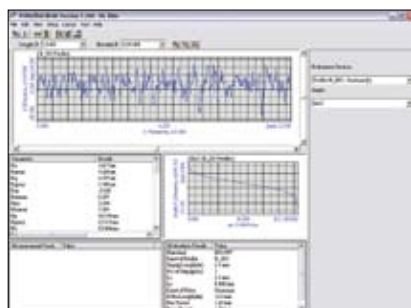
*Optional Y-axis table and Ø1-axis rotary table are required for automatic execution **Measurement data network system consisting of a variety of Mitutoyo measuring machines

FORMTRACEPAK: Focusing on more efficient measurement and automation

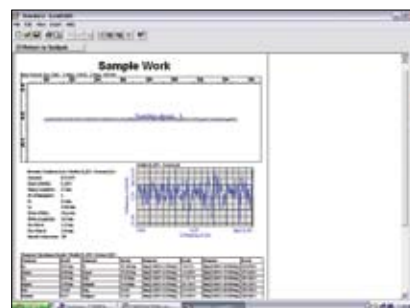
Enables control of the optional motor-driven Y-axis table and rotary table for realizing efficient measurement automation. Contour evaluation that allows free analysis of level differences, angle, pitch, area and other characteristics based on surface roughness data can also be performed. In addition, an original inspection certificate can be created by setting the print format to suit particular requirements.



Measurement screen



Surface roughness result screen



Print screen

Example where using FORMTRACEPAK can implement more efficient measurement using motor-driven options



Using Y-axis table



Using rotary table Ø1

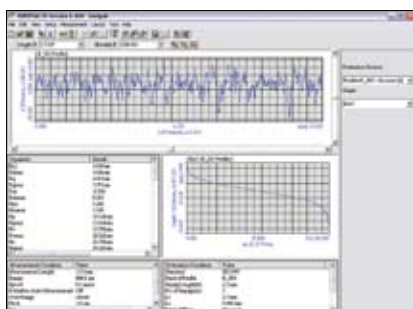


Using rotary table Ø2

SURFPAK-SV: Best-selling dedicated software for surface roughness analysis

The column can move vertically and automatic measurement performed.

In addition, an original inspection certificate can be created just by setting the print format.



Measurement and result display screen



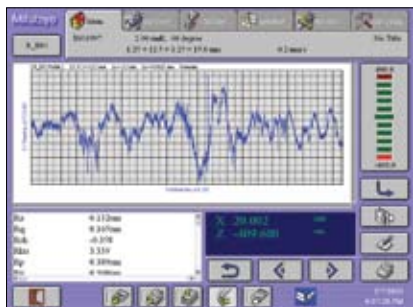
Set-up screen



Print screen

SURFPAK-EZ/TC: Simple graphic display and button arrangement for intuitive operation

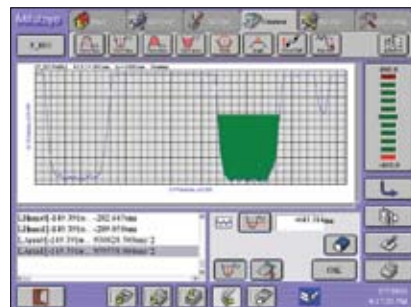
SURFPAK is available for use either on a PC or for operation with the TCON dedicated touch-panel controller. Both versions include simple contour analysis functions such as for level difference, area, angle, and circle calculations.



Measurement and result display screen



Calibration/control screen



Simple contour analysis screen



SURFPAK-EZ
(PC based)



SURFPAK-TC
(touch-panel based)

Coordinate Measuring Machines	1
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Form Measurement	3
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Digital Scale and DRO Systems	7
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